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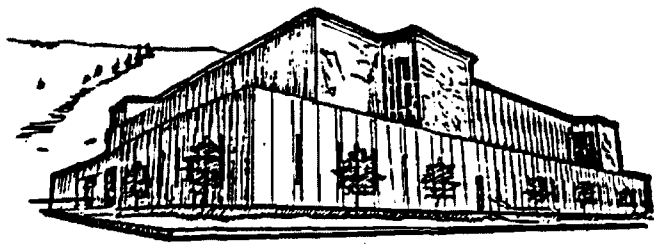
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ENVIRONMENTAL EDUCATION IN KENYA:  
THE NEED FOR A COMMUNITY-BASED BIOLOGY CURRICULUM IN THE  
SECONDARY SCHOOLS

by

Suanne Unger

B. S., University of Wisconsin--Madison, 1988

Presented in partial fulfillment of the requirements for the degree of

Master of Science

Environmental Studies

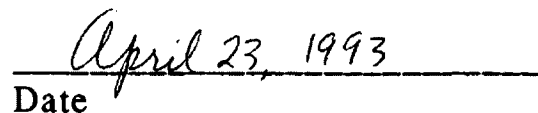
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## Acknowledgements

I would like to express my sincere gratitude and appreciation to the following persons:

Bruce Jennings, Ph.D., whose constant guidance and support throughout, enriched the writing of this paper. It was he who challenged and inspired me to look beneath the surface and discover the questions.

Ebert Pfeiffer, Ph.D., who has provided support and friendship since the beginning of my graduate studies. It was he who helped me to attain an internship with the United Nations Environment Programme in Kenya and provided encouragement all along for my endeavors.

Lee Metzgar, Ph.D., for his guidance and recommendations in writing this paper. His approach to teaching biology was also an inspiration to me as his teaching assistant for two years.

To Dorcas Otieno, whose friendship and assistance helped make my research project with the United Nations Environment Programme possible.

To Jacque Nasutcha Owino, my friend, who expediently sent me materials needed for my paper.

And lastly, to my mother, father, siblings and friends for their constant support and encouragement.

## **Preface**

The impetus for this paper was my three month internship at the United Nations Environment Programme (UNEP) in Nairobi, Kenya. Working under the auspices of Dr. Michael Atchia, head of the Education and Training Unit, I constructed a questionnaire which was distributed to several biology teachers in the Nairobi school district. The questionnaire dealt with the teaching of environmental issues in the subject of biology. Although this paper does not include the results from the study, the information provided was useful in my further analysis of the topic.



## **Introduction**

Environmental education world-wide is increasingly seen as a necessity. With the destruction of forests, the pollution of water and the air, increases in desertification and losses in biodiversity, governments are realizing that continued growth must be met with sustainable practices. Both the developed and developing nations are implementing strategies in order to educate the public about environmental issues and concerns.

Educating people about the environment takes place in both formal settings, (e.g., within the structure of the school environment) as well as non-formal settings (e.g., out in the fields, within local organizations). This paper examines the incorporation of environmental education into secondary schools in Kenya and will assume that formal education can play a role in the development of attitudes and skills that can better enable students to become active participants in environmental matters. In examining the secondary school curriculum of Kenya, the particular focus will be on the incorporation of environmental education into the curriculum for the biological sciences, a subject area which encompasses several topics relevant to environmental education. Although the coverage of environmental topics in the subject of biology can not, in itself, provide a complete approach to environmental education, it can be

used to demonstrate how environmental education has been incorporated into the secondary level of education in Kenya.

With a predominantly rural population that is dependent upon agriculture and pastoralism for a livelihood, Kenya requires an educational program that provides students with the necessary skills to be effective in the development of their communities as well as the necessary skills to continue with higher education. Because the majority of students will return to rural communities after completing their secondary education, it is important that community environmental issues be addressed and emphasized in the curriculum. Researchers propose that community environmental issues be addressed using an issue-based approach whereby students acquire skills through studying a local problem in the community.

It can be demonstrated that attempts made to "environmentalize" the curriculum in Kenya fall short of the recommendations set forth by the International Environmental Education Program (IEEP) for the successful implementation of environmental education programs. This discrepancy can be demonstrated by examining both the goals for environmental education as stated by the IEEP and comparing these to the curriculum utilized to teach environmental concepts within the biology classroom. By comparing these two items it becomes clear that the biology curriculum is lacking, particularly in reference to providing students with opportunities to become actively engaged in the identification and resolution of environmental problems and in presenting an interdisciplinary approach to the study of environmental problems. The biology

curriculum lacks an interdisciplinary approach to solving environmental problems and consequently fails to explain important social, political and economic factors surrounding environmental issues. Although environmental concepts and themes are incorporated throughout the secondary curriculum, there is a need to integrate the issues *within* and *between* the disciplines as well.

The biology curriculum also fails to engage students in the process of solving environmental problems. In order for students to become active participants in the resolution of such problems, the curriculum must be modified to address community environmental issues. Curricular reform, however, involves other far-reaching changes in the educational structure as a whole, thus, making the implementation of a community-based program more difficult. Barriers to a community-based program include the existence of a national examination; negative attitudes towards community education; and political resistance to empowering people through active decision-making. These barriers, along with the failure to identify the fundamental causes of environmental degradation, present obstacles to the effective implementation of environmental education in Kenya.

### **Interdisciplinary Approach to Identifying Environmental Problems**

Environmental issues cannot be divorced from the social, political and economic realities present in society. Often overlooked in reference to environmental problems are development

schemes which lack sensitivity to the environment and inequalities present in a society and between societies. If causal factors have been mis-identified or neglected, then attempts to resolve environmental problems through education or other means will be in vain. Thus, it is important to understand how the Kenyan government perceives environmental problems because this has profound implications for environmental education.

In Kenya, it appears that environmental problems are often blamed on the people and the problems of overpopulation and mismanagement of the land. To illustrate this point, Martin Redfern, the Nairobi correspondent of the "New Scientist" identifies the irony in the words and actions of Paul Ngei, Kenya's Minister for the Environment. Redfern cites Ngei directing the blame for environmental problems on the actions of deprived people. He then indicates that two days prior to this statement, Ngei announced plans to deforest 17,000 hectares of Kenya's national forest in order to provide space for government tea plantations.<sup>1</sup> Until contradictions such as this are erased, it will be difficult to arrive at workable solutions for preserving the environment through education.

On a broader scale, the International Environmental Education Programme (IEEP), a program of the United Nations, has also failed to identify such contradictions. In several educational posters developed by the IEEP one gets the impression that the locus of environmental problems falls with the individual rather than with economic inequalities within and between countries and other forces beyond the control of the individual. For example, on a poster entitled "Deforestation and Desertification" there are eleven

suggestions offered for actions that can be taken to prevent deforestation and desertification. Of the suggestions offered, none refer to the mass destruction of tropical forests that has been funded by the World Bank for development schemes.<sup>2</sup> Instead, suggestions such as "educate and encourage farmers to conserve their land" and "develop and disseminate conservation and countryside code of ethics" direct attention to the farmers as the locus of the problem of deforestation rather than to other forces beyond their control.<sup>3</sup> If the IEEP's response to solving the problem of deforestation is mostly directed at educating the farmers rather than focusing on the fundamental causes of deforestation, then it is clear that environmental education in this case would be in vain.

The information provided on the posters exemplifies the conservative position of the International Environmental Education Programme in reference to the solution of environmental problems. Levins and Lewontin assert that United Nations scientists are "subject to the constraints of realism" and must approach environmental problems with a humanitarian and apolitical agenda in mind. Thus, solutions are aimed at promoting stability rather than encouraging more dramatic changes to preserve the environment. For example, "nutritional programs must not ask about the distribution of wealth, plant pathologists do not touch land tenure..."

<sup>4</sup> Since IEEP is an international body and provides a model for the implementation of environmental education world wide, it is not surprising that environmental education programs fail to address certain issues, as described above, in their curriculum.

The approach to teaching environmental concepts in the biology curriculum in Kenyan schools is no exception. In the biology syllabus, there is little or no reference at all to some of the major culprits of environmental destruction; development projects, inequitable land distributions, and agribusiness. For example, in the standard biology text, under the subheading "Influences of Man's Activities on the Environment," the book describes "man" as the culprit in environmental ills without acknowledging forces beyond the individual's control:

As man interacts with his environment, he often misuses the natural resources. Large areas of land are constantly being ruined due to soil erosion, which is the result of poor methods of cultivation, deforestation and overgrazing. Man has also misused plants and animals, exterminating many of them. If man is to continue to survive, he must understand his environment and use his natural resources wisely, not only for himself but also for future generations.<sup>5</sup>

The text quoted above is problematic for several reasons. First of all, there is no reference to the reliance on cash crops for export and the effect this has had on the land and the people. Secondly, deforestation and overgrazing can be viewed as symptoms of poor development plans and inequitable land distribution, yet this is overlooked as well. Without using an interdisciplinary approach in the study of environmental problems, important omissions are made which are vital to the understanding of the issues.

It is not surprising to find these issues absent from the curriculum due to their political implications. Nevertheless, they are important issues and their omission is of great significance to the resolution of environmental problems. Michael Redclift describes this point well: "So many causes of the environmental crisis are structural, with roots in social institutions and economic relationships, that anything other than a political treatment of the environment lacks credibility."<sup>6</sup> Consequently, it is important that environmental problems be approached in an interdisciplinary manner. An environmental education program that enables students to become active participants in the resolution of environmental problems would be ineffective if the issues were not perceived holistically.

### **Environmental Issues of Kenya**

Kenya is a country of diverse peoples and landscapes. In an area of 582,644 km<sup>2</sup>, there are large areas of deserts, equatorial mountains with snow existing year-round, tropical rainforests, savannas, a tropical coastal area and a population of approximately 23.5 million people<sup>7</sup> from over 30 different ethnic groups.<sup>8</sup> The beauty of the country lies in its diversity.

The majority of the Kenyan people live in rural areas and nearly 75 per cent of the population depend on farming and pastoralism for a livelihood. Agriculture thus accounts for 35 per cent of the GDP.<sup>9</sup> The amount of land suitable for cultivation of crops, however, is only about 20 per cent. Another 9 per cent of the land is considered cultivatable, but is prone to periodic drought

conditions. The remaining land is semi-arid to arid and is utilized mainly for cattle production.<sup>10</sup> A growing area of concern for the Kenyan government has been the problems of population growth coupled with the declining productivity of the cultivatable land base. It has been estimated that by the year 2000, Kenya will be able to feed only 17% of its population utilizing its own land.<sup>11</sup> Thus, Kenya will become more dependent on imports for basic subsistence crops. Intensified soil erosion and the use of inefficient agricultural practices to feed a growing population have been identified as causal factors.<sup>12</sup>

Environmentalist Wangari Maathai, founder of "The Green Belt Movement" in Kenya, professes that soil erosion is Kenya's most urgent environmental problem today.<sup>13</sup> The loss of fertile top soil has been attributed to a growing population putting excess demands on the land and contributing to deforestation and the destruction of vegetation cover, greater numbers of livestock, and the increasing marginalization of agriculture. The consequence of soil erosion coupled with periodic drought has been desertification, particularly in the northern parts of Kenya.<sup>14</sup>

The nomadic peoples of northern Kenya are confronted with the problem of a deteriorating land base for grazing animals. Comprising between 15-25% of the Kenyan population, the nomads own over 30% of the cattle, 69% of the goats, 66% of the sheep and 100% of the camels. Faced with a growing population and the existence of droughts in the northern region, these people have unique environmental concerns. Population pressures, however, must be considered in conjunction with poorly planned development



schemes which have encouraged both "irrational water development policies" and settlement of the nomadic peoples. Both of these features helped to disrupt the traditional land-use strategies used by the nomadic peoples to effectively control the use of the range.<sup>15</sup>

According to the World Bank, pressures on the land due to an ever increasing growth in population remain a primary obstacle to Kenya's development. Much of the blame for the loss of productive land has been targeted at the people and the problem of overpopulation. The fact that the World Bank proposes an aggressive population policy over other possible solutions affirms this idea.<sup>16</sup> Although quick to place blame for unproductive land on the people, the World Bank has been responsible for funding major irrigation projects in Kenya, such as the Bura Irrigation Settlement (1977), which have resulted in deforestation and land degradation. Documents from this project conclude: "The project has not been successful, and the wildlife component has suffered from poor implementation. For example, the forest is being cut down for charcoal production and fuel wood."<sup>17</sup> Thus, the unsustainable projects of the World Bank can not be dismissed from contributing to environmental degradation.

Critical of the World Bank's approach to solving the problem of land degradation in Kenya, Randall Baker claims that international agencies often approach the problem of land degradation using a "technocratic approach" or "physical approach". In essence, the agencies attempt to apply technical solutions to environmental problems while disregarding important social and political dimensions. In other words, they fail to see:

environmental stress as symptomatic of a social and political crisis usually based on : unequal control over access to, and use of, the natural environmental resource base; the 'developmental' conflict between export-based cash crops, foreign exchange and basic food security for the poor, as well as short-term asset stripping for a quick profit by those who make, or are beyond the control of, the laws. <sup>18</sup>

The failure to address these issues is also prevalent in policy documents for the United Nations Environment Program, such as the Desertification Control Bulletin. The solutions offered are, again, technical and tend to focus on the problem of overpopulation.<sup>19</sup> With a population growth rate of 3.8% annually, one of the highest in the world, Kenya must confront the issue of overpopulation. However, by continuing to place the blame on overpopulation, other important issues are neglected. The tendency to place the blame on overpopulation was also prevalent at the 1992 Earth Summit Conference in Brazil: "To single out 'population' as 'the greatest threat to the environment'- a view that dominated many commentaries on the Earth Summit- is to downplay the destruction caused by consumerist lifestyles, the workings of the market and the activities of commerce."<sup>20</sup>

The solutions to environmental problems in Kenya must address important social and political questions regarding land ownership and export versus subsistence cropping in order to realistically assess the problem. According to a 1982 statistic, 10% of Kenyan families owned 73% of the land and 50% of farmers owned only 5% of the land.<sup>21</sup> Farmers comprising the 50% and the

nearly half million landless families are those most often marginalized and forced to farm on land that is unsuitable for cultivation, thus leading to poor agricultural practices.

A solution to the large numbers of marginalized farmers should be sought in the realm of land reform. The sub-division of former European-owned land, which is some of the best land in Kenya, was initiated in 1980 and resulted in the transfer of 2.1 million hectares of land to Africans in the form of "settlement schemes, subdivision, plantations, and ranches."<sup>22</sup> Despite these subdivisions, the distribution of land holdings still remains distorted today.<sup>23</sup> Large farms still account for one-seventh of the arable agricultural land.<sup>24</sup> It has been estimated that with a radical redistribution of the existing land, approximately 3.1 million new farms could be produced.<sup>25</sup> The possibility of further land divisions in Kenya, however, appears unlikely according to the views expressed by the government in a report on 'land tenure and use' published in 1986. The report emphasizes: "The sanctity of private land ownership will be respected in Kenya."<sup>26</sup>

Kenya's reliance on cash crops for export also discourages dramatic changes in land distribution. In 1985, approximately 54% of Kenya's export earnings were derived from only two crops: tea and coffee.<sup>27</sup> While estimated that less than 5% of the agricultural land-base is used for tea and coffee, this is often the most productive land and could be used to grow crops for the domestic market.<sup>28</sup> Instead, Kenya must utilize a portion of its export earnings to import basic foodstuffs such as maize and wheat for the people of Kenya. Presently, Kenya imports nearly 40% of the wheat utilized for

domestic consumption.<sup>29</sup> According to the "Country Study & Norwegian Aid Review" document for Kenya, the growth of the country is dependent on "programs and policies oriented toward food crops and needs of small farmers."<sup>30</sup> Although the government has begun to act on the need for increased domestic food production, many of the products cultivated are geared toward the urban market.<sup>31</sup>

As a consequence of the emphasis on cash crops in certain areas, such as the sugar belt of western Kenya, there has been a lack of food supplies in that area as well as resulting nutritional deficiencies.<sup>32</sup> It is interesting to note that reference to nutritional deficiencies as a consequence of cash crops is made in the chapter on human health in the Kenyan biology textbook:

Traditional eating habits are quickly changing because of rapid urbanisation, change from subsistence to cash crop farming, etc. Healthy subsistence crops like simsim and groundnuts are being replaced with cash crops like sugarcane, coffee and tea. This has contributed to unbalanced diets in some areas of the country.<sup>33</sup>

Although the issue of cash crops is directly related to several topics in the unit on ecology, this reference is the only one found in the biology textbooks.

The production of cash crops could be justified if the people were benefitting from the profits and sustainable land practices were being exercised; however, this is not always the case. For example, in the production of pineapples for export from Kenya, Del Monte relied almost exclusively on imported items for processing and packaging

the items for export. This cost intensive process suggests that the remaining earnings of foreign exchange are minimal and do not benefit the Kenyan people.<sup>34</sup>

Another area of environmental concerns can be housed under the issue of biodiversity. Due to the destruction of habitat and expansions in human settlements, the land for wild animals has been significantly reduced. Dr. Richard Leakey, head of the Kenya Wildlife Service, attributes these and other land-use changes to be the greatest threat to wildlife in Kenya.<sup>35</sup> Decreasing rangelands for agriculture as well as the threat of poachers have led to the endangerment of many species of wild animals such as the rhino and the leopard. However, the threat of poaching has been significantly reduced through the greater control of national parks and reserves by the Kenya Wildlife Service.<sup>36</sup> With approximately 45% of Kenya's foreign exchange coming from wildlife-related tourism, it is not surprising that conservation is supported by the government.<sup>37</sup>

The issue of biodiversity also arises in the coastal areas of Kenya where the spread of tourism has led to the development of resorts on the coast, thus leading to the demise of sacred groves (small groups of trees lacking undergrowth) of land referred to as *Kayas* by the Digo people of the coast.<sup>38</sup> The development of resorts on the coast has also led to the dumping of raw sewage in the sea and at inland sites, both causing threats to human health and affecting plant and animal life in the ocean.<sup>39</sup> Thus, the tourism industry has played a significant role in the creation of environmental problems in the coastal regions of Kenya.

The urban centers of Kenya, such as Nairobi, Mombasa and Kisumu face environmental degradation similar to that found in the cities of industrialized nations. Due to poor environmental standards, the degree of air, water and land pollution is often greater. Overcrowding in these larger industrialized centers has also led to the development of large slum areas which lack sanitary living conditions. Many of the inhabitants of these slums are considered 'environmental refugees' who have deserted their unproductive lands in hopes of finding a better life in the cities.<sup>40</sup>

In the overcrowded slums surrounding the cities, it is common to see mounds of garbage lying on the street. According to an article in the Daily Nation: "Of the 800 metric tonnes of garbage generated daily by Nairobi residents, only 40 percent is collected. The rest is left in the estates piling up into mountains of stinking refuse."<sup>41</sup> Solutions to the garbage problem are clearly political because the government, rather than the private sector, is responsible for the collection of garbage. It is interesting to note, however, the number of articles on this subject that focus on individuals being part of the solution to the problem, thus implying that they have created the problem. For example, Winnie Ogana writes:

the acting Town Clerk of Nairobi, Esther Adumas, said that since Nairobi residents generated an average of 0.04 kg. of rubbish daily, each person should therefore see it as his or her own responsibility to chip in in assisting the local authority with its collection.<sup>42</sup>

Numerous photographs showing city residents cleaning up the streets further testifies that individuals are seen as the locus of the problem. This has important implications for the teaching of environmental education because people's perceptions are formed through the media and the media in this case seems to be skirting the real issues. The topics of human health and ecology in the biology syllabus correspond directly with the problems encountered in urban living situations, however not in a holistic manner so as to address the causes of these problems which have profound political, cultural and social implications.

These are only some of the environmental problems confronting Kenya. It is clear from the examples given above that environmental problems are intricately related to political, economic and social issues and thus must address these if solutions are to be found. A curriculum that is nationally controlled does not permit the study of local environmental problems, thus denying students the opportunity to get involved in environmental activism. Both of these points demonstrate the need for a curriculum that is both interdisciplinary in approach and addresses the needs of the community.

### **Development of International Environmental Education**

The international community advocates interdisciplinary environmental programs to involve students with efforts to solve problems. Internationally, the importance of environmental education has only been realized since the United Nations Conference on the Human Environment in 1972, held in Stockholm. At this conference,

participants stressed the importance of education for both the public and the specialist as a means of solving and preventing global environmental problems. One of the recommendations proposed as a result of this conference was to establish an international program in environmental education. Consequently, UNESCO, in conjunction with the United Nations Environment Programme (UNEP) launched the **International Environmental Education Programme (IEEP)** in January of 1975.<sup>43</sup>

In October of 1975, an international environmental education workshop was held in Belgrade. The aims of the workshop were to observe the trends and issues in environmental education as well as to formulate recommendations for furthering environmental education internationally. One of the results of this workshop was the establishment of the Belgrade Charter which has provided a frame of reference for world-wide environmental education.

The goal of environmental education was defined through the Belgrade Charter:

The goal of environmental education is to develop a population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.<sup>44</sup>

In order to reach the goals set for environmental education, the participants at the Belgrade Workshop identified six objectives. These



six objectives of environmental education were then reduced to five in the Tbilisi Declaration, 1977. The objectives endorsed by the Tbilisi Declaration are as follows:

**Awareness-** to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

**Knowledge-** to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.

**Attitudes-** to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

**Skills-** to help social groups and individuals acquire the skills for identifying and solving environmental problems.

**Participation-** to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward the resolution of environmental problems.<sup>45</sup>

The hierarchical structure of these objectives implies that the ultimate goal of environmental education should be to provide individuals with the opportunity to be active in the resolution of environmental problems. In UNEP and IEEP documents this goal often overlaps with mention of community school education and its relevance to environmental education. In a document published by UNEP, Donella Meadows refers to the community as a resource as well as a vehicle for choosing relevant issues for the study of environmental education.<sup>46</sup> Thus, community school-based education is endorsed by the international environmental education community.<sup>47</sup>

In October 1977, as a culmination of the first phase of IEEP's activities, the first **Inter-governmental Conference on Environmental Education** took place in Tbilisi, in the former U.S.S.R. The participants at this conference concluded that the need for international co-operation with respect to environmental education was a necessity, particularly for developing countries.<sup>48</sup> The conference also established some general guidelines for environmental education that have formed the basis for many of the environmental education programs in existence today. Potentially effective environmental education programs were perceived to regard environmental education as:

...a dimension of education, interdisciplinary in approach, directed at problem-solving and concerned with local realities, and which need to be integrated into all forms of the educational process.<sup>49</sup>

Kenya has a history of environmental education that precedes international recognition of its importance. Prior to the Stockholm Conference in 1972, some environmental concepts and themes formed an integral part of the secondary curriculum in Kenya. For example, such topics as soil erosion, crop rotation, pollution, and the significance of forests to rainfall were integrated into the subjects of geography, general science, biological science, and the African Social Studies Program.<sup>50</sup> Even colonial education had elements of environmental education, yet the conservation policies imposed upon the Kenyans were repressive and thus account for persisting negative attitudes towards conservation today.<sup>51</sup> Although elements of environmental education

existed prior to the establishment of guidelines and recommendations set forth by the international community, the further evolution of environmental education in Kenya has been greatly influenced by these developments.

In reaction to the 1972 Stockholm Conference, the Kenyan government strengthened its policies on environmental education in the schools through the creation of various government bodies such as the National Environment Secretariat (NES) and later a joint committee between NES and the National Committee on Educational Policy and Objectives.<sup>52</sup> Established in 1971 as the first national environmental protection agency in Africa,<sup>53</sup> the NES mainly served the functions of research, publishing and educating others about the environment.<sup>54</sup> Although activities of the NES have been constrained by government bureaucracy, fears of delaying development, and the lack of internal funds, the NES has played some role in formal education. For example, the agency has promoted tree planting and nursery development in many Kenyan schools. The NES has also assisted with the preparation of curriculum materials for courses in ecology, environmental science and geography at the university level.<sup>55</sup> The NES, however, has been criticized for its lack of involvement with research activities and contacts with training institutions.<sup>56</sup>

Currently, the incorporation of environmental education into the formal education system in Kenya is managed by both the government ministries and educational institutions. The environmental education section of the NES works in conjunction with the Kenya Institute of Education, Kenyatta University College and Kenya Science Teachers College on the development and implementation of curriculum in

environmental education for the schools.<sup>57</sup> Despite the apparently coordinated efforts, in a Kenyan Country Report for a sub-regional workshop on teacher-training for Africa, Ellen Wanaswa states that Kenya has yet to develop a comprehensive syllabus of environmental education in both formal and non-formal education.<sup>58</sup> However, without an entire restructuring of the methods of teaching environmental education in Kenya so that the objective of participation is accomplished, the further development of a comprehensive syllabus would be in vain.

### **Environmental Education in the Formal School System in Kenya**

#### **Infusion of Environmental Content into Disciplines**

As was mentioned previously, environmental concepts and themes are included in various disciplines in the secondary schools of Kenya. Rather than developing an entire course to teach environmental topics, the national curriculum has been "infused" with environmental topics, as was recommended by the Belgrade Charter. Infusion can be defined as "the integration of content and skills into existing courses in a manner as to focus on the content (and/or skills) without jeopardizing the integrity of the courses themselves."<sup>59</sup>

In the 1979-1983 Development Plan, a major policy document, the Kenyan government's commitment to the development of environmental education is asserted. This plan states that:

environmental consideration must be brought to the attention of every citizen. Hence environmental education will be introduced in the schools, not as a separate discipline, but as a dimension to be considered in various aspects of the curriculum.<sup>60</sup>

Consequently, curricular modifications included expanding the amount of environmental information in the curriculum and distributing the topics into all relevant disciplines.<sup>61</sup> Although the importance of environmental education is recognized by the Kenyan government, conservative modifications in the curriculum, such as adding environmental content, serves only to perpetuate an already knowledge-based curriculum. Effective curricular modifications in environmental education need to address not only the amount of content, but also the strategies used to implement environmental education.

The practice of infusing subject matter with environmental education is a popular strategy for implementing environmental education in developing countries as was concluded in a world-wide survey by UNESCO.<sup>62</sup> A successful infusion strategy would require that environmental concepts and themes be distributed throughout all relevant subject areas, thus providing a multidisciplinary approach. In this respect, Kenya has been relatively successful at achieving a multidisciplinary approach to environmental education as is evidenced by the infusion of environmental topics throughout many disciplines. However, a successful infusion strategy would not only involve the placement of environmental concepts and themes

throughout each discipline, but would also entail linking issues within each subject area and between the separate disciplines to provide a cohesive understanding of the various environmental issues.

The infusion of environmental education throughout various disciplines, however, does not in itself demonstrate that the goals for environmental education have been achieved in the Kenyan secondary schools. The success of an environmental education program depends not only on the distribution of environmental content throughout various disciplines, but also on the strategies employed by each discipline to convey the material. Establishing an interdisciplinary environmental program in the Kenyan secondary schools would require developing relationships between the various disciplines based on common themes. John Lemmons, professor of biology and environmental science at the University of New England claims that environmental problems, rather than the separate disciplines should be the core of study in the schools. By teaching environmental content in separate disciplines without establishing relationships, Lemmons states that:

Key concepts or methods are often omitted or superficially presented without providing the necessary emphasis with respect to process orientation and problem-solving methodology which integrates concepts from one discipline into the context of other disciplines.<sup>63</sup>

Thus, an infusion strategy alone, without establishing relationships between different discipline, offers a fragmented approach to

environmental education. Perhaps Wanaswa's reference to the need for a comprehensive syllabus for environmental education, as cited previously, relates to a lack of established relationships between disciplines in Kenya.

### **Curricular Innovations Since 1985**

The Kenyan educational system has implemented some major curriculum innovations since 1985 in an effort to make the curriculum more relevant to the needs of the country. With the change to an 8-4-4 structure of schooling whereby primary school has a duration of eight years, secondary school a duration of four, and university schooling a duration of four as well, came a complete restructuring of the curriculum. Both the course requirements and curriculum contents were altered in order to establish a more technically and practically-oriented education.<sup>64</sup> The justification behind this entire revamping of the educational system was to provide an education that would better prepare school-leavers with the skills and knowledge necessary to become self-employed in a country where unemployment is a major problem.<sup>65</sup> Since its hasty inception in 1985, however, the 8-4-4 schooling system has continually been criticized for various reasons.

Critics of the 8-4-4 system claim that the new system is too demanding for both the students and teachers and that most schools lack the proper facilities to appropriately implement the required coursework.<sup>66</sup> For example, the new system is biased toward the sciences and often tests scientific laboratory skills on the national examinations, yet 40% of the schools do not have laboratory facilities. Consequently, there have been a large number of failures in the

sciences on the national examinations, particularly amongst students in arid and semi-arid regions of the country where amenities are often lacking.<sup>67</sup> In reaction to comments regarding the high demands of the 8-4-4 system, the Kenyan Secondary Council for Examinations has since reduced the required number of subjects to be examined at the completion of secondary school from ten to eight.<sup>68</sup>

Critical of the modified curriculum, lawyer Paul Muite claims that the system has failed to present a practically-oriented curriculum of relevance to the students as was intended:

Children have been made to resort to memorizing and parroting things they do not understand instead of being taught how to think.<sup>69</sup>

Muite's comment reflects upon the type of schooling imposed by the colonial administration. Although Kenya has attempted to make the curriculum more relevant, elements of an alienated curriculum remain.

The new 8-4-4 system did present some contributions to the area of environmental education, however. According to Dr. Korir-Koech of Kenyatta University, the transition from the old system to the current 8-4-4 system coincided with the addition of more environmental education to the syllabus.<sup>70</sup> Koech, however, does not mention any modifications in the strategies for teaching environmental education. Attempts at making the curriculum more relevant to the country's needs are exemplified below in reference to the teaching of environmental issues.



### **Secondary Education in Kenya**

For the secondary school level in Kenya, the Kenya Institute of Education has developed courses containing environmental themes: agriculture, geography, social science, home education, history, social education and ethnic science, physics, chemistry, biology and the arts curriculum.<sup>71</sup> Also, according to the International Environmental Education newsletter, "Connect," one of the required courses for the Kenya Certificate of Secondary Education is "Population and environmental education."<sup>72</sup>

### **Wildlife Clubs in Kenya**

Several secondary schools and training colleges in Kenya have wildlife clubs which are extra-curricular. These clubs are often popular and provide a means by which students can arrange to see the wildlife parks. The number of wildlife clubs in Kenya has increased dramatically from the initial membership of 12 schools in 1968 to over 570 as of 1978. Other developing countries that have set up programs similar to the Wildlife Clubs in Kenya include: Uganda, Tanzania, Cameroon, Zambia, Botswana, Malawi and India.<sup>73</sup> Although these clubs are important tools for promoting environmental awareness, their existence does not substitute the need for a curriculum that involves participation in community issues.<sup>74</sup>

### **Tertiary Education in Kenya**

There are several tertiary academic institutions in Kenya that cater to potential teachers of secondary education. At the Kenya Science Teachers College, one of the Diploma Colleges, enrolled students must

complete a one year course in environmental science which includes the topics of ecology, demography, conservation, pollution, energy and food.<sup>75</sup> Kenya appears to be more advanced in its training of teachers in environmental education than other developing countries. Some countries, like Ethiopia, are just beginning to train teachers in environmental education, while others are interested in doing so but lack the resources and technical skills to do so.<sup>76</sup>

The syllabus of environmental education for Diploma Colleges in Kenya, however, has been criticized for its emphasis on the cognitive domain and its lack of action-oriented objectives for environmental issues.<sup>77</sup> The syllabus reflects the main objectives of environmental education in Kenya:

- 1) to create an awareness of the environment, how it should be used and conserved,
- 2) to develop correct attitudes towards the tasks related to environmental conservation that will render environmental education welcome.<sup>78</sup>

Since neither objective states the importance of becoming an active participant in the resolution of environmental issues, it is not surprising to find this objective missing from the tertiary syllabi as well as the secondary syllabi.

At Kenyatta University, the Center for Environmental Education has been developed as a separate department. The center offers a program for postgraduates of Diploma Colleges (Teacher Training Colleges) whereby upon completion of their courses, these tutors can train pre-service teachers for secondary schools in the subject of environmental education.<sup>79</sup> Moi University offers environmental

education at both the undergraduate and postgraduate level to students majoring in certain disciplines. Finally, the University of Nairobi also offers environmental studies at the postgraduate level.<sup>80</sup> Therefore, each of the three public universities in Kenya include environmental education to varying degrees within their "broad-based academic curricula"<sup>81</sup>

The above discussion concerning the incorporation of environmental education into existing curriculum demonstrates that efforts have been made by the Kenyan government to address environmental issues within the formal school system. In order to more closely examine how environmental issues have been addressed in the secondary schools, the subject of biology will be utilized to exemplify the integration of various environmental concepts and themes into a subject area.

### **The Development of Biology in Kenya**

The historical development of the subject of biology in Kenya is another chapter in the legacy of colonial education. When Kenya achieved independence from Britain in 1963, the educational infrastructure was in need of reconstruction; however, there were no indigenous educational models to emulate. Consequently, Kenya looked to Britain for modern curriculum models and subsequently adopted British models for science education. Given the belief that scientific knowledge in itself was universal, objective and 'culturally-neutral,' it was assumed that, with some modifications, the models for science curriculum could easily be transferred from Britain to Kenya. For the biological sciences, modifications in the curriculum

included alterations in the level of language used and the use of local examples.<sup>82</sup>

The science curriculum innovations in Kenya became known as the Schools Science Project (SSP), a modern curriculum development with its origins in the British and American influenced Nuffield Sciences. Unlike chemistry and physics the SSP biology was derived mostly from a UNESCO-sponsored reform programme; however, this programme was also based on British and American models.<sup>83</sup>

SSP was officially inaugurated in 1967 and was mostly controlled by expatriates teaching in a minority of progressive schools. Although the objectives for teaching science in Kenya at this time included seeing science as part of a general education and applying science to the local community, neither of these objectives were fulfilled through the SSP:

..it must be realised that making science part of a 'general' education in no way implied 'science for all'... SSP was developed *in* and- as we shall see- *for* upper-echelon schools in a highly selective sector of education. Similarly, the interpretation of 'the application of science to the local community' is likely to be somewhat superficial in schools where the aim, and the practice, of secondary education is an escape from the local community and movement into the modern sector.<sup>84</sup>

In the 1970's, SSP began to lose popularity and, in 1976, was terminated as an independent program and integrated with the traditional science courses. The influence of SSP, however, is still visible in the secondary curriculum of Kenya today and is recognized

by the stated emphasis on an investigative approach to learning science.

The syllabus for the biological sciences in Kenya encompasses two topics relevant to environmental education: ecology and human health. Ecology is taught in the third year of secondary school while human health is taught in the fourth and final year. The topics of ecology and human health begin to address some of the environmental problems of the country, thus creating an awareness of these issues. There are many other environmental issues that Kenyans face, however, and the curriculum should address these issues not only to provide an awareness of them but to also provide a means by which students can become actively involved resolving them. The government of Kenya has asserted its stance on awareness of environmental issues thus: "It is essential to make the public aware of the importance of conservation and enhancement of the environment in carrying out their activities."<sup>85</sup>

The subject of biology is only one of the disciplines which has been infused with environmental concepts and themes in the secondary curriculum of Kenya. Although the subject of biology inherently possesses topics of environmental interest, it must be stressed that neither biology nor other scientific disciplines are necessarily the best vehicle for the teaching of environmental education. Too often environmental education is restricted to the sciences and as a consequence fails to address other fundamental questions. Fenshaw claims that focusing on the sciences alone draws attention away from critical issues that surround environmental problems because

Subjects like literature, social studies, commercial subjects, physical sciences and mathematics are much more likely to be the real bases that will get at the social values, political organizations, economic policies and structures, technological control and development, and national and international patterns of distribution that determine the environmental situation.<sup>86</sup>

It is discouraging to note that some leaders in the field of biological sciences envision the sciences, and biology in particular, to be the panacea to environmental problems. Concluding remarks from a seminar held at the United Nations Environment Programme in Nairobi in 1991 by the International Union of Biological Sciences Commission for Biological Education (IUBS-CBE) reveal the views of those influencing curriculum development in biology. Dr. Atchia, the head of Education and Training at UNEP remarks: "From the curricular point of view the conceptual basis and methodology of environmental education or studies and of sustainable development education (as advocated here) must be science and the scientific method with the science of life playing a major role."<sup>87</sup> This view envisions a technocratic approach to solving environmental problems, an approach that Randall Baker claims can only lead to negative consequences: "It is not technology which marginalised populations require, especially where that technology will tend to confirm them where they are. They want a share of the better resources now earmarked to feed the already over-fed."<sup>88</sup>

Consequently, the sciences alone do not have the capability of solving world environmental problems. However, when scientific

information is relevant to the community and addresses important social , cultural and political dimensions of environmental issues, it can become an effective means of teaching environmental education.

### **Community-based biology**

Many researchers in the field of environmental education have proposed that a community-based biological curricula would offer a more relevant science education in developing countries. The main argument for this type of education is to provide the students, most of whom will not progress to the university, with the necessary skills and knowledge to become active participants in the development of their communities, rather than to prepare them only for further education. Thompson claims that an environmental approach with a focus on the local community rather than on the studies of disciplines will "result in a more genuinely and uniquely African form of education"<sup>89</sup> Julius Nyerere, the former president of Tanzania, was also a proponent of community-based education. In the essay entitled "Education for Self-Reliance", Nyerere states:

This is what our educational system has to encourage. It has to foster the social goals of living together for the common good... Our education must therefore inculcate a sense of commitment to the total community....<sup>90</sup>

At present, the impact of formal schooling appears to be minimal in this respect: "School practice allows learning to remain rather separated from actual rural reality and it contains little in terms of skills or attitudes that would enable school leavers to act innovative

in that environment."<sup>91</sup> Consequently, in Kenya, with a predominantly rural population (85%) that depends on farming and pastoralism,<sup>92</sup> it would appear that a more relevant curriculum based in part on community development skills would be of more benefit to the development of the nation as a whole than a curriculum that lacks these characteristics.

Despite the potential benefits of a community-based education, Kenya has resisted its implementation, seeing it as an inferior education.<sup>93</sup> Even the Harambee Schools in Kenya, which have originated from community efforts, have not chosen a community-based education adapted to local conditions.<sup>94</sup>

P.J. Kelly differentiates between traditional scientific biology and community biology. Kelly claims that biology for community development differs in three ways: a community approach gives priority in the curriculum to biological issues of community application; it places a greater emphasis on human biology; and it emphasizes issue studies rather than knowledge studies.<sup>95</sup>

Dr. Gary Knamiller suggests that the opportunity to develop a community-based biological curriculum in rural schools in developing countries is tremendous based on the assumption that the children in the community hold a wealth of knowledge regarding their environment. The knowledge they possess about water resources, firewood, infants and food crops can provide a foundation for learning biological information using an issue-based approach.<sup>96</sup> Kelly states: "Issue studies, in fact, involve similar skills and attitudes to those needed generally in dealing with the problems of community development."<sup>97</sup> An issue-based approach to learning



biology differs from a knowledge-based approach in the following ways:

### **ISSUE-BASED STUDIES**

- Study a local problem in the community
- Focus on learning the skills of gathering, recording, and analysing information for the purpose of decision-making and social action
- Integrated approach to curriculum and learning
- Assumption: that children will be better equipped to make decisions and participate in community action on issues relevant to their lives when they leave school

### **KNOWLEDGE-BASED STUDIES**

- Study particular academic subjects (maths, science, etc)
- Focus on learning the facts concepts and skills associated with a particular academic subject. No focus on decision-making and social action.
- Subject-based curriculum and learning
- Assumption: that children will continue to the next stage of schooling (i.e. will progress from primary to junior secondary to secondary to university to paid employment <sup>98</sup>

Inevitably, community-based biology with an issue-based approach also requires a certain degree of knowledge-based studies as well. There are, however, few examples of community-based biological curriculums that utilize an issue-based approach in the formal school system in developing countries.<sup>99</sup>

### **Papua New Guinea's Community Schools**

One of the few documented "success" stories of community-based education exists in Papua New Guinea. Papua New Guinea's approach to education may provide a model for Kenya as both are aiming toward the same goal: educating a predominantly rural population that is dependent on agriculture.

In 1978, the Secondary Schools Community Extension Project (SSCEP) was initiated in Papua New Guinea in an effort to help promote rural development. In this program, students are involved in community extension programs; the development of core projects with practical application to the community; and outstations where classes spend a term of their schooling outside the school environment.<sup>100</sup> The curriculum of SSCEP is community-based and utilizes an issue-based approach to the study of problems in the community. By utilizing this approach, it is hoped that school-leavers will contribute to rural development through self-employment as well as attain the necessary skills to be active members in their communities.

SSCEP also aims to prepare students who will continue with higher education. By drawing upon the core academic subjects (in Papua New Guinea's high schools) of mathematics, science, social science and English, SSCEP aims to provide the academic skills needed for further education.<sup>101</sup> Research has indicated that teaching through community projects has improved student's abilities to learn academic skills.<sup>102</sup> Research has also shown that most students feel better prepared for community involvement if they have had experience with public participation.<sup>103</sup>

The teaching of biology in SSCEP is accomplished through a general integrated science course at the 9th and 10th grade levels. The science course is qualitative and includes units on: traditional technology, chemical technology, ecology, geology and communications.<sup>104</sup> In the unit on chemical technology, students in grade 10 learn about water and water treatment through utilizing

the resources of the community: "...direct use could be made of a village water supply system which the outstation had installed with the cooperation of a neighbouring village."<sup>105</sup>

### **Kenya and Community-based Biology**

In Kenya, there has been little attempt to teach the biological sciences using an issue-based approach. Although the syllabus relates some biological principles to real life situations, the approach is mainly through knowledge studies or investigative enquiry, both of which are insufficient procedures for addressing environmental problems.<sup>106</sup> Thus, while there are many examples in the biology syllabus and textbooks where biological information has been related to the community, there are few activities that suggest practical application of the material to the community.

It is clear from looking at the objectives of the biological sciences course that application of the material is an intended goal for the learner, yet the course is not designed to facilitate the implementation of the information. For example, in the unit on human health, there are no suggested activities at the end of the chapter that advocate the study of a local problem in the community. Below is a list of the suggested activities that are described in the student's textbook. These activities coincide with the subtopics: eating habits, human diseases, immune responses, water, sewage and refuse disposal, effect of pollution and human health, and first aid:

1. Test for carbohydrates.
2. Test for fats.
3. Test for Vitamin C.
4. Food preservation methods.
5. Examination of preserved animal parasites.
6. Examination of prepared slides of parasites.
7. Construction of a water filter.
8. Visit to a sewage treatment plant.
9. Carrying out an antigen/antibody immune response using a male frog.
10. Common emergencies that require first aid before a doctor arrives or before a patient is transferred to a medical clinic or hospital.<sup>107</sup>

These activities obviously do not advocate the study of a local problem in the community. Although these activities provide the learner with relevant skills in the area of human health, these same skills could be acquired through the study of a local problem where the information is integrated even further. It is generally assumed that by using a community-based approach that the learner will be better equipped to make decisions and be an active participant in his/her community.

The unit on ecology also has the potential to involve students in environmental projects that have direct relevance to the community. However, as in the unit on human health, none of the suggested activities involve the study of a local problem in the community. The activities instead involve only the acquisition of skills utilized in ecological studies based on the information presented in the syllabus:

1. Carry out a long term (two or three terms) study of environmental factors in the school compound or ecology plot.
2. Collect, record, analyse and interpret data from ecological studies.
3. Write up a comprehensive report on an ecological study carried out.
4. Carry out an ecological study in anyone of the following habitats: forest, grassland, and one in the following aquatic habitats: marine, fresh water (e.g., pond, river or lake).
5. Analyse droppings of various animals or the contents of their guts to find out what they feed on.
6. Visit an agricultural institute, fishery, museum, an arboretum, research station and a national park or a game reserve.<sup>108</sup>

The activities in the ecology unit involve collecting data and analyzing the information to draw conclusions about an ecological study. It is questionable, however, whether some teachers in Kenya are prepared and/or have the necessary time to implement such an ecological study as is described in this list of activities. In a study conducted by Myra Mutsune, results showed that the majority of teachers questioned (16 out of 25) found the topic of "ecology" to be the most difficult to teach to their students. In offering solutions, teachers suggested that more time be allotted to the topic of "ecology" in the syllabus, that the information be simplified, and that more specifics be given regarding the type of projects expected.<sup>109</sup> Although the syllabus was reformed after this 1983 study, the suggested activities for ecology still remain vague.

The activities in this unit are not only vague, but also lack an issue-based approach to studying an ecological problem. If the activities were centered around a problem in the local community,

the same skills could be taught while simultaneously empowering the students through decision-making to participate in community issues relevant to their lives. For example, if the school were located near a lake used by the local community, a study could be developed based on the preservation of the lake. Students could study the effects of fishing, the dumping of materials in the lake, or any other issues of relevance to that habitat. The information gained through this type of study would not only be useful in terms of acquiring new skills, but would also benefit the community. The benefits of a community-based education are many, but there are also many problems with its implementation.

### **Problems with community-based biology/issue-based approach**

The intentional neglect of activities involving community applications may be a consequence of several factors. The amount of time involved in an issue-based study would exceed that of a knowledge-based study, thus narrowing the amount of biological information to be covered in a course. In an already overcrowded syllabus, incorporating an issue-based approach to learning some topics may be met with disfavor by both teachers and students who already feel pressure to complete the material in preparation for the national examinations. Consequently, if an issue-based approach were to be adopted in the biological syllabus, the national examinations for biology would need to reflect this modification.

The continued existence of a national examination in Kenya serves as a major barrier to any type of educational innovation in the

country. Due to the emphasis placed on national examinations, teachers become most concerned with teaching material that is expected to appear on the examinations, rather than being concerned with the relevance of the material they are teaching and its potential applications. Individual schools are thus restricted from adopting any changes that might be more relevant to the students of that particular community. Furthermore, the philosophy behind an educational system based on a national examination is contradictory to the practice of community schooling: "In nations where this process of selection is based on performance or terminal examinations, this structure dictates policies and procedures to the schools which may be in antithesis to the community school approach."<sup>110</sup> As far as environmental education is concerned, Vulliamy claims that the most important reform to promote environmental studies would be a change in the examination methods designed to promote it.<sup>111</sup>

Although a national examination and certification present barriers to innovation, they are viewed by the people as providing a legitimate and equitable means of obtaining access to further education and social rewards via merit.<sup>112</sup> Although this may appear equitable, it is actually illusory because schools in rural areas often lack the necessary amenities to successfully implement the curriculum. Consequently, students may be exposed to the same information, yet their understanding of it may differ due to inconsistencies in resource availabilities and teacher competencies.<sup>113</sup> Breaking through the examination-certification

cycle will require an alternative that appears equally just; however, no such alternative system has been presented to the people.

Dr. Michael Atchia, director of the Education and Training Unit at the United Nations Environment Programme in Nairobi, also questions the additional responsibilities for teachers suggested by community-oriented biological courses. He states: "It is much easier to restrict oneself to theoretical (knowledge) studies than to deal with reality, particularly when this reality demands regular confrontation with the community at large"<sup>114</sup>

Another obstacle to adopting an issue-based approach to learning biological information may be a consequence of its potential political implications. An issue-based approach to learning biology would involve broadening the discipline of biology so as to include the social, cultural and political dimensions to various issues of community concern. A curriculum such as this may appear 'threatening' to a certain extent in a nation such as Kenya where the political tone is increasingly authoritarian.<sup>115</sup> Once people become more aware of problems and the issues surrounding them and are empowered to participate in their solution, radical theoreticians such as Paulo Freire claim that this will bring about a cultural revolution in which oppressive social structures are abolished.<sup>116</sup> Thus, it is safer for the ruling elite to practice a system of 'divide and rule' whereby problems are 'focalized' rather than viewed in their totality so as to avoid conflict that may encourage organized opposition.<sup>117</sup>

In 1989, for example, when concerned citizens in Nairobi organized to oppose the construction of a sixty-story building in downtown Nairobi's Uhuru Park (one of the few 'green areas' left in



the city), the government suppressed these protests and denied people the freedom to participate in public dissent.<sup>118</sup> Cultural revolution is precisely what the Kenyan government is trying to avoid as is evident by the repressive political atmosphere of the country. Milton McClaren addresses this issue well in the following statement: "By continually avoiding the connection between learning and action, public education has seriously disempowered students by removing an entire kind of feedback from the cycle of learning"<sup>119</sup> Thus, the promotion of a community-based biological curriculum has many implications that must be tempered with an understanding of the social, political and cultural atmosphere of the country.

The existence of a national examination and syllabus and the lack of formalized community-based education are realities in Kenya and must have political motivations behind them. Freire argues that educational systems are often designed to perpetuate the existence of the elite in a society and, consequently, the transformation of an educational system is not possible without a radical transformation in the society: "In fact, it is not education that molds society to certain standard, but society that forms itself by its own standards and molds education to conform with those values that sustain it. Since this is not a mechanical process, a society that structures education to benefit those in power invariably has within it the fundamental elements for its self-preservation"<sup>120</sup> This statement serves to exemplify the notion that educational innovations such as introducing an environmentally-oriented, community-based biological program are not readily implemented within an educational system without other far-reaching changes.

## Conclusion

Drastic changes in the strategies used to teach environmental education in Kenya are necessary in order to provide students with the necessary skills and opportunities to participate in environmental matters. The scope of environmental problems and development concerns attests to the need for both educational and governmental programs that are sensitive to the needs of the communities. Students in Kenya, however, continue to learn environmental issues through the incorporation of fragmented concepts and themes throughout several disciplines in the secondary schools. By using this piecemeal approach and omitting vital connections, students become disempowered and less capable of making informed decisions about the environment. Also, there is little opportunity for students to be involved in the resolution of environmental issues as is evidenced by the types of activities presented in the biology syllabus. If the Kenyan government is sincere about its commitment to the environment and environmental education, the issues of an interdisciplinary approach to environmental education and student participation in environmental problem-solving must be addressed.

Adopting an issue-based approach to the subject of biology would naturally expose the multi-faceted nature of environmental issues. By further involving students in community environmental issues, the curriculum has greater relevance and also has the potential to assist in sustainable rural development. Students involved in the resolution of environmental problems in their

community would develop the skills necessary to be active decision-makers and participants in environmental matters.

The opposition to community-based biology programs as well as other community-based ones, however, is a reality that has political, social and cultural implications. Such a program would not be possible without restructuring formal education and the methods of assessment. The national examination serves as a major barrier as well as the general attitude towards discipline-oriented education as the only route to success. The political motivations behind maintaining a secondary educational program that aims mostly at preparing a select number of individuals for further education must be reexamined in light of the current environmental crisis and the needs of the country and people.

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